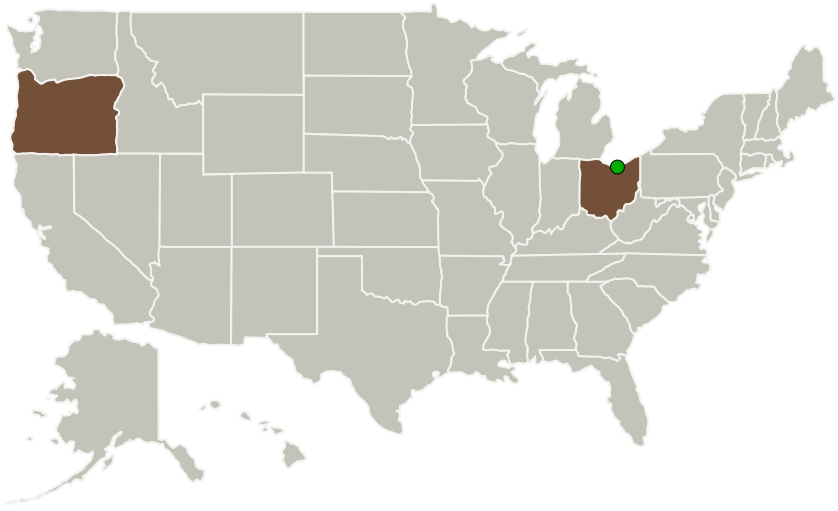
Cathode for Electric Space Propulsion Utilizing Iodine as Propellant, Phase I

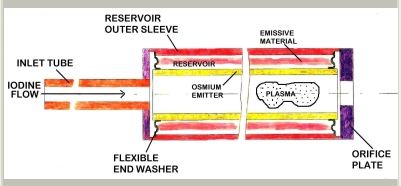
Completed Technology Project (2017 - 2017)

Project Introduction

We propose a hollow reservoir cathode suitable for use in ion or Hall thrusters which utilizes iodine as a propellant. Reservoir cathodes have several unique features which will allow them to resist the corrosive effects of iodine. Chief amongst these is that the barium-emission-material-containing reservoir is isolated from the iodine flow. This allows free barium to be produced in an environment free of iodine. Furthermore, barium production rates in reservoir cathodes can be adjusted to very high levels -- high enough to overcome the deleterious effects of iodine at the cathode's emitting surface. Reservoir cathodes carry a barium supply that is 100 times that of conventional cathodes. Furthermore, the reservoir cathode inserts can be made of materials other than tungsten. This is not possible with impregnated cathodes. These materials can be selected for their resistance to iodine attack. They include osmium, rhodium, and iridium. NASA is pursuing iodine EP because of iodine's advantages over xenon, especially for small satellite propulsion. Most important are its low cost and its high storage density. Also, it requires no high-pressure, large and heavy pressure vessels.

Primary U.S. Work Locations and Key Partners





Cathode for Electric Space Propulsion Utilizing Iodine as Propellant, Phase I Briefing Chart Image

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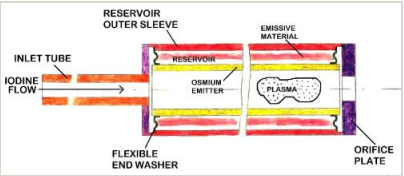
Organizations Performing Work	Role	Type	Location
e-beam, Inc.	Lead Organization	Industry Veteran-Owned Small Business (VOSB)	Beaverton, Oregon
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Oregon

Images



Briefing Chart Image
Cathode for Electric Space Propulsion Utilizing Iodine as Propellant, Phase I Briefing Chart Image
(https://techport.nasa.gov/image/129881)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
e-beam, Inc.

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

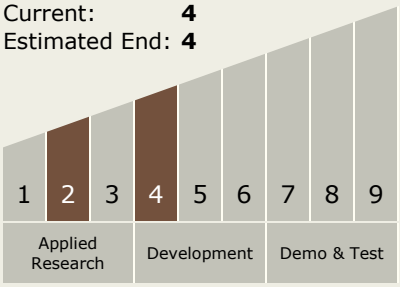
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Bernard K Vancil

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.2 Electric Space Propulsion
    - TX01.2.2 Electrostatic